

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inv(s): Vladimir Pavlovic and James M. Rehg

Confirmation No.: 1940

Application No.: 10/662,067

Examiner: Not assigned

Filing Date: 09/12/03

Group Art Unit: 2621

Title: METHOD FOR VISUAL TRACKING USING SWITCHING LINEAR DYNAMIC SYSTEM MODELS

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

This Information Disclosure Statement is submitted:

- ☒ under 37 CFR 1.97(b), or
(Within three months of filing national application; or date of entry of national application; or before mailing date of first office action on the merits; whichever occurs last)
- ☐ under 37 CFR 1.97 (c) together with either a:
☐ Statement under 37 CFR 1.97(e), or
☐ a \$180.00 fee under 37 CFR 1.17(p), or
(After the CFR 1.97 (b) time period, but before final action or notice of allowance, whichever occurs first)
- ☐ under 37 CFR 1.97 (d) together with a:
☐ Statement under 37 CFR 1.97(e)(1) or (2), and
☐ a \$180.00 fee set forth in 37 CFR 1.17(p).
(Filed after final action, a notice of allowance, on or before payment of the issue fee)

Please charge to Deposit Account **08-2025** the sum of \$0.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **08-2025** pursuant to 37 CFR 1.25.

☒ Applicant(s) submit herewith Form PTO 1449 - Information Disclosure Statement together with any required copies of patents, publications or other information of which applicant(s) are aware, which applicant(s) believe(s) may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

☐ A concise explanation of the relevance of foreign language patents, foreign language publications and other foreign language information listed on PTO Form 1449, as presently understood by the individuals(s) designated in 37 CFR 1.56 (c) most knowledgeable about the content is given on the attached sheet, or where a foreign language patent is cited in a search report or other action by a foreign patent office in a counterpart foreign application, an English language version of the search report or action which indicates the degree of relevance found by the foreign office is listed on form PTO 1449 and is enclosed herewith.

It is requested that the information disclosed herein be made of record in this application.

☒ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450. Date of Deposit: 1/27/04
OR

☐ I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number _____ on _____
Number of pages: _____

Typed Name: Margaret A. Norcutt

Signature: Margaret A. Norcutt

Respectfully submitted,

Hamilton, Brook, Smith & Reynolds, P.C.

By Mary Lou Wakimura
Mary Lou Wakimura

Attorney/Agent for Applicant(s)

Reg. No. **31,804**

Date: 1-27-04

Telephone No.: (978) 341-0036

FORM PTO-1449

ATTY. DOCKET NO.

APPLICATION NO.

CONFIRMATION NO.

200308305-2

10/662,067

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

REFERENCE DESIGNATION

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	1A	6,480,876 B2	11/12/02	Rehg et al.	
	1B	6,396,878 B1	05/28/02	Piirainen	
	1C	6,314,204 B1	11/06/01	Cham et al.	
	1D	6,256,418 B1	07/03/01	Rehg et al.	
	1E	5,243,037 B1	06/05/01	Pulford et al.	
	1F	6,226,409 B1	05/01/01	Cham et al.	
	1G	6,064,703	05/16/00	Cusani et al.	
	1H	5,923,712	07/13/99	Leyendecker et al.	
	1I	5,325,098	06/28/94	Blair et al.	
	1J	6,393,046 B1	05/21/02	Kohli et al.	
	1K				

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	1L					
	1M					
	1N					
	1O					
	1P					

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

	1Q	Murphy, Kevin P., Switching Kalman Filters, August 21, 1998, pp. 1-16.
	1R	Murphy, Kevin P., Inference and Learning in Hybrid Bayesian Networks, Report No. UCB/CSD-98-990, January 1998, pp. 1-18.
	1S	Ghahramani, Zoubin and Hinton, G.E., Variational Learning for Switching State-Space Models, Gatsby Computational Neuroscience Unit,, pp. 1-26.

EXAMINER

DATE CONSIDERED

PATENT APPLICATION

Sheet 2 of 6

FORM PTO-1449

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

ATTY. DOCKET NO.

200308305-2

APPLICATION NO.

10/662,067

CONFIRMATION NO.

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

REFERENCE DESIGNATION

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	2A			
	2B			
	2C			
	2D			
	2E			
	2F			
	2G			
	2H			
	2I			
	2J			
	2K			

FOREIGN PATENT DOCUMENTS

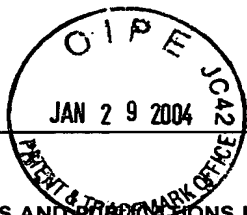
	DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	2L				
	2M				
	2N				
	2O				
	2P				

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

2Q	Pavlovic, Vladimir, et al., Time-Series Classification Using Mixed-State Dynamic Bayesian Networks, In Computer Vision and Pattern Recognition, pp. 609-615, June 1999.
2R	Pavlovic, Vladimir, et al., A Dynamic Bayesian Network Approach to Figure Tracking Using Learned Dynamic Models.
2S	Welch, Greg and Bishop, Gary, An Introduction to the Kalman Filter, Department of Computer Science, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3175, September 17, 1997, pp. 1-16.

EXAMINER

DATE CONSIDERED



PATENT APPLICATION

Sheet 3 of 6

FORM PTO-1449

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

ATTY. DOCKET NO.

200308305-2

APPLICATION NO.

10/662,067

CONFIRMATION NO.

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

REFERENCE DESIGNATION

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	3A				
	3B				
	3C				
	3D				
	3E				
	3F				
	3G				
	3H				
	3I				
	3J				
	3K				

FOREIGN PATENT DOCUMENTS

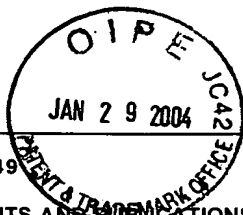
		DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	3L					
	3M					
	3N					
	3O					
	3P					

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

	3Q	http://www.scs.leeds.ac.uk/scs-only/teaching-materials/HiddenMarkovModels/html_dev/main.html .
	3R	Shumway, R.H. and Stoffer, D.S., Dynamic Linear Models with Switching, Journal of the American Statistical Association, September 1991, Vol. 86, No. 415.
	3S	Bar-Shalom Y. Li, X-R, Estimation & Tracking: principles, techniques, and software. YBS, Storrs, CT, 1998, pp. 446-484.

EXAMINER

DATE CONSIDERED

**PATENT APPLICATION**

Sheet 4 of 6

FORM PTO-1449

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

ATTY. DOCKET NO.

200308305-2

APPLICATION NO.

10/662,067

CONFIRMATION NO.

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

REFERENCE DESIGNATION**U.S. PATENT DOCUMENTS**

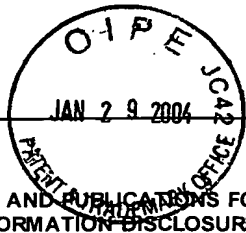
EXAMINER INITIAL		DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	4A				
	4B				
	4C				
	4D				
	4E				
	4F				
	4G				
	4H				
	4I				
	4J				
	4K				

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	4L					
	4M					
	4N					
	4O					
	4P					

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

	4Q	Jordan, M.I., et al., An Introduction to Variational Methods for Graphical Models, October 11, 1999, http://www.stat.berkeley.edu/tech-reports/index.html , Report#508.
	4R	Ghahramani, Z., et al., Switching State-Space Models, pp. 1-23. Technical Report CRG-TR-96-3, Dept. of Computer Science, University of Toronto.
	4S	Rabiner, L.R. and Juang, B.H., An Introduction to Hidden Markov Models, IEEE ASSP Magazine, January 1986, pp. 4-16.
EXAMINER		DATE CONSIDERED

**PATENT APPLICATION**

Sheet 5 of 6

FORM PTO-1449

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

ATTY. DOCKET NO.

200308305-2

APPLICATION NO.

10/662,067

CONFIRMATION NO.

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

REFERENCE DESIGNATION**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	5A				
	5B				
	5C				
	5D				
	5E				
	5F				
	5G				
	5H				
	5I				
	5J				
	5K				

FOREIGN PATENT DOCUMENTS

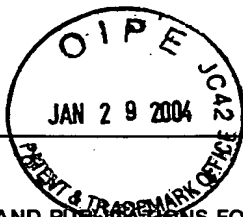
		DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	5L					
	5M					
	5N					
	5O					
	5P					

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

	5Q	Kim, Chang-Jin, Dynamic Linear Models with Markov-Switching, Journal of Econometrics 60, (1994) pp. 1-22.
	5R	Krishnamurthy, V. and Evans, J., Finite-Dimensional Filters for Passive Tracking of Markov Jump Linear Systems, Automatica, Vol. 34, No. 6, pp.765-770, 1998.
	5S	Minka, Thomas P., From Hidden Markov Models to Linear Dynamical Systems, pp. 1-10. ftp://vismod.www.media.mit.edu/pub/tpminka/papers/minka-lds-tut.ps.gz .

EXAMINER

DATE CONSIDERED



PATENT APPLICATION

Sheet 6 of 6

FORM PTO-1449

LIST OF PATENTS AND PUBLICATIONS FOR
APPLICANT'S INFORMATION DISCLOSURE
STATEMENT

(Use several sheets if necessary)

ATTY. DOCKET NO.

200308305-2

APPLICATION NO.

10/662,067

CONFIRMATION NO.

1940

APPLICANT

Vladimir Pavlovic et al.

FILING DATE

9/12/03

GROUP

2621

REFERENCE DESIGNATION

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	PUBLICATION DATE	NAME	Pages, Columns, Lines Where Relevant Passages or Figures Appear
	6A				
	6B				
	6C				
	6D				
	6E				
	6F				
	6G				
	6H				
	6I				
	6J				
	6K				

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	PUBLICATION DATE	NAME OF PATENTEE OR APPLICANT	Pages/Columns/Lines Where Relevant Passages/Figures Appear	Check if Translation attached
	6L					
	6M					
	6N					
	6O					
	6P					

OTHER REFERENCES (including Author, Title, Date, Pertinent Pages, etc.)

	6Q	Ghahramani, Z. and Hinton G.E., Parameter Estimation for Linear Dynamical Systems, pp. 1-6, Technical Report CRG-TR-96-2, Dept. of Computer Science, University of Toronto.
	6R	A Brief Introduction to Graphical Models and Bayesian Networks, http://www.cs.berkeley.edu/murphyk/Bayes/bayes.html , pp. 1-19.
	6S	Maybeck, P.S., Stochastic Models, Estimation, and Control, Vol. I Academic Press, 1979.

EXAMINER

DATE CONSIDERED